

## REMARKS/ARGUMENTS

This Response is in response to the Office Action dated December 11, 2008.

Claims 1-48 are pending.

In the above-mentioned Office Action, the Examiner stated that the application contains patentably distinct species. In particular, the Examiner stated:

**Species I, corresponding to claims 1-17 directing to a magnetic sensor. . .**

**Species II, corresponding to claims 18-33 directing to a magnetic sensor with a pair of magnetically hard bias layers.**

**Species III, corresponding to claims 34-48 directing to a magnetic sensor with a pair of magnetically hard bias layers grown on one of the seed layers. . .**

**The species are independent or distinct because claims to the different species recite mutually exclusive characteristics of such species. In addition, these species are not obvious variants of each other based on the current record. . . Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits . . .**

Applicant hereby elects Species I, claims 1-17, with traverse. Claim 1 is generic.

However, Applicant also respectfully submits that the species do not recite mutually exclusive characteristics. In particular, Applicant notes that FIG. 2 of the present application corresponds to independent claims 1, 18, and 34. In particular, claim 1 recites:

1. A magnetic sensor comprising:
  - an antiferromagnetic layer;
  - a first ferromagnetic layer disposed over the antiferromagnetic layer, the first ferromagnetic layer having a magnetization that is pinned by the antiferromagnetic layer;
  - a second ferromagnetic layer disposed over the first ferromagnetic layer, the second ferromagnetic layer having a magnetization that rotates due to an applied magnetic field;
  - a third ferromagnetic layer disposed adjacent to an end of the second ferromagnetic layer, the third ferromagnetic layer having a primarily in-plane magnetization providing a magnetic field to stabilize the end of the second ferromagnetic layer;
  - an amorphous, metallic, nonmagnetic underlayer disposed adjacent to the antiferromagnetic layer; and

a crystalline seed layer disposed between the underlayer and the third ferromagnetic layer, the seed layer having a crystalline structure that promotes the in-plane magnetization of the third ferromagnetic layer.

Similarly, claim 18 recites:

18. A magnetic sensor comprising:  
an antiferromagnetic layer having a crystalline structure;  
a pinned ferromagnetic layer disposed over the antiferromagnetic layer;  
a free ferromagnetic layer disposed over the pinned ferromagnetic layer, the free ferromagnetic layer having a magnetization that rotates due to an applied magnetic field;  
a pair of magnetically hard bias layers disposed adjacent to opposite ends of the free ferromagnetic layer, the bias layers having a primarily in-plane magnetization providing a magnetic field to stabilize the ends of the free ferromagnetic layer;  
a pair of amorphous, metallic, nonmagnetic underlayers disposed adjacent to the antiferromagnetic layer to isolate the crystalline structure of the antiferromagnetic layer; and  
a pair of crystalline seed layers, each of the seed layers disposed between one of the underlayers and one of the bias layers to promote the in-plane magnetization of the bias layers.

Claim 34 recites:

34. A magnetic sensor comprising:  
an antiferromagnetic layer having a crystalline structure;  
a pinned ferromagnetic layer disposed over the antiferromagnetic layer;  
a free ferromagnetic layer disposed over the pinned ferromagnetic layer, the free ferromagnetic layer having a magnetization that rotates due to an applied magnetic field;  
a pair of amorphous, metallic, nonmagnetic underlayers disposed adjacent to the antiferromagnetic layer to isolate the crystalline structure of the antiferromagnetic layer;  
a pair of crystalline seed layers, each of the seed layers disposed over one of the underlayers; and  
a pair of magnetically hard bias layers disposed adjacent to opposite ends of the free ferromagnetic layer, each of the bias layers grown on one of the seed layers to have a primarily in-plane magnetization providing a magnetic field to stabilize the ends of the free ferromagnetic layer.

Thus, claim 1 recites a third ferromagnetic layer. Claims 18 and 34 each recites a pair of magnetically hard bias layers. One of the pair of the magnetically hard bias layers may be analogous to this third ferromagnetic layer. In one embodiment, these

layers correspond to the bias layer(s) 152 of FIG. 2. See also, Specification, paragraph 18. Claim 1 recites an amorphous, metallic nonmagnetic underlayer. Similarly, claims 18 and 34 recite a pair of amorphous, metallic, nonmagnetic underlayers. In one embodiment, these layers correspond to the layers 150 depicted in FIG. 2. See also, specification, paragraphs 17-18. Claim 1 recites a crystalline seed layer between the underlayer and the third magnetic layer. Similarly, claims 18 and 34 recite a pair of crystalline seed layers between the underlayers and the hard bias layers. In one embodiment, these layers correspond to the crystalline seed layers 151 depicted in FIG. 2. See also, specification, paragraphs 17-18. Thus, Applicant respectfully submits that the species corresponding to claims 1, 18, and 34 are not mutually exclusive. Accordingly, Applicant respectfully traverses the Examiner's election/restriction requirement.

In view of the foregoing, Applicant's attorney believes that this application is in condition for allowance. Should any unresolved issues remain, Examiner is invited to call Applicant's attorney at the telephone number indicated below.

Respectfully submitted,

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